Available online at www.sciencedirect.com

ScienceDirect

Energy Procedia 5 (2011) 2178–2182

Energy Procedia

IACEED2010

Challenges and Strategies of Chinese Low-carbon Trade

Wang Xiaofang*

[a]*Beijing Union University, Beijing, 100101,P.R.China,*
[b]*Graduate school. the Chinese Academy of Social Sciences, Beijing, 102488,P.R.China,*

Abstract

The world is increasingly attaching importance to low-carbon economy, and more and more nations attempt to develop international trade in a low-carbon approach. Low-carbon trade, for China, means both challenges and opportunities. China is playing an important role in the international market. On the one hand, China is confronted with low per capita resource and serious environmental contamination. On the other hand, it's gaining favorable balance of trade at the cost of large-amount energy and resource consumption and destructive damages to the nature. Therefore, low-carbon economy becomes the only solution that China has to take in foreign trade. China needs to alleviate heavy pressure, assume international responsibilities, and further participate in international division of labor by transforming its foreign trade growth pattern into an environment-friendly and low-carbon mode based on the country's realities.

Keywords: lowcarbon Trade; Strategies; China

1. Introduction

Low-carbon economy is widely recognized as an irreversible development trend, and low-carbon trade is stressed by countries across the world under economic globalization. Low-carbon economy is a development trend aiming at reducing energy consumption and pollutant emission, improving energy utilization rate, and establishing an environmentally friendly economic development mechanism. The global financial crisis burst out in 2008 urged the world to develop low-carbon economy. The US, EU and

* Corresponding author. Tel.: 086-010-64900231; fax: 086-010-64900715 The paper is funded by Natural Science Foundation of China (70703001), Beijing Natural Science Foundation(8083026), Beijing's the 11th Five-year Planning Program(07BaJG176) and Beijing Municipal Education Commission (SM200811417009).

E-mail address: ldtwxf@buu.edu.cn.

doi:10.1016/j.egypro.2011.03.376

Japan initiated unprecedented economic stimulus packages focusing on low-carbon investment fields. Low-carbon economy was taken as an important drive to realize global pollutant emission objectives and promote economic recovery and sustainable development. Based on innovative technological and institutional advantages, major developed countries facilitated the development and implementation of low-carbon economy strategies, attempting to create a new layout of industrial and technological competition. Low-carbon economy will help China, with low per capita resource and serious pollution, make energies to full use, perfect energy structure, and enhance energy security. As China is rising in the international market, low-carbon trade is the best choice for the country to compete against with others. China needs to take an advantageous part in international labor division, mitigate realistic pressure, and undertake international responsibilities by reducing energy consumption and pollutant emission, transforming economic growth mode, and creating an environment-friendly foreign trade structure.

2. Research on low-carbon trade

Low-carbon emission is a common concern when one state trades with another. Scholars throughout the world have made an agreement that low-carbon trade could act as a basic means to balance world economic development, guarantee energy security and deal with climate change. Low-carbon trade is often researched from the following three perspectives:

2.1 Theoretical and Empirical research

Grossman and Krueger (1991) proposed scale effect, structure effect and technical effect in the research of environmental impacts of the North American Free Trade Area and sets up a basic analysis frame on environmental impact of foreign trade. Wyckoff and Roop (1994) found from trade and carbon emission data of OECD states from 1984 to 1986 that the carbon hidden in finished goods imported to OECD states accounted for 13% of the total emission amount. Ahmad and Wyckoff (2003) calculated carbon dioxide emission in goods trade of 24 nations and proved the impacts on global emission caused by geographically industrial transfer. Peters and Hertwich (2008) calculation result indicated carbon dioxide amount contained in global trade was 5.3 billion tons in 2001. Many Chinese and foreign scholars have studied the association between pollutant emission and foreign trade of China as Chinese export has be mission in China came from the goods exported from China to the US. Based on Chinese input/output statement and export statistic, Qi Ye et al (2008) estimated carbon dioxide emission included in all exports from China since 1997 to 2006 by viewing the carbon emission coefficient of Japanese commodities as the standard coefficient of all imports. Yan Yunfeng (2009) computed carbon emission embodied in Sino-US bilateral trade and analyzed the reason why both trade and embodied carbon went out of balance.

2.2 Conclusion

First, low-carbon requirement adds a new element in world trade. Traditional elements consist of capital, labor, technology, and natural resource. Now, the carbon element makes a difference. The international trade structure will change. As carbon emission right business flourishes day by day, the right would probably circulate free across boarders like labor, capital and technology and replace some amount of trade in goods. Second, the current international trade structure will experience changes. Developed countries are advantageous in energy technology, so they expect to get hold of top positions in future competition through low-carbon economy. Developing countries, whose industrialization progresses haven't finished, might be forced to retreat from international labor division. When carbon element appears in each and every field in world economy, carbon emission right rareness may probably turn up in different parts on the international industrial chain, which needs restructuring in the future.

Third, low-carbon element will be leveraged as a new tool in trade protection. Developed countries deem low-carbon economy as an invention to establish a new barrier and gain monopolistic competition strengths. For developing countries, stringent emission standards are totally technical discrimination. Actions of greenhouse gases emission reduction appealed by developed countries will generate pressure on developing countries that haven't assumed any obligations of reducing emission. Advanced countries intend to link climate change response to foreign trade by collecting the so-called carbon tariff. This will alter competitive positions in multi-lateral trade and put export of developing nations into big troubles.

3. Current situation and development obstacles of low-carbon economy in China

3.1 Current situation

China is a big trader but not an influential one. China's foreign trade depends on export of manufacturing products, and the export structure is extensive and unsustainable. The nation maintains trade surplus at the cost of energy and resource consumption and environmental contamination at the same time within the national territory. Chinese energy consumption per unit of GDP is three times of American consumption, five times of German and six times of Japanese. Low-carbon demand is a resistance, and also an incentive. In recent years, China took many steps to transfer the trade growth model by promoting product quality and enriching technical content. The export rebate rate of high-energy-consumption, serious-pollution resource products has been kept low and tariff was imposed on some such products from 2007. China is greeting high economic growth rate, so it's a long way to go to develop low-carbon economy.

3.2 Development obstacles

China has to spare no efforts to consolidate its competitive position in the global market through developing low-carbon economy. But it's not an easy job.

- Limit of natural resource

Chinese per capita energy/resource is low, though China ranks at the first place in hydro energy in the world, the third place in proved coal reserve, and the eleventh place in proved oil reserve. Proved energy amount of regular commodities is 155-billion-ton standard coal, accounting for 10.7% of the world's total. However, proved per capita energy/resource amount in China is only 135-ton standard coal, which is 51% of the world's average. According to current energy and resource conditions as well as supply-demand relation, Chinese energy structure won't thoroughly change by 2020, and coal consumption will remain at above 60%. Carbon dioxide emission coefficient of oil is 80% of coal, and gas 60%.

- Current economic development phase

High-carbon economy stands in the way of China's sustainable development. While Chinese industrialization and urbanization are speeding up, the nation's demand for energy is increasing. Under extensive economic growth mode and basic energy consumption, strict carbon emission game rule is bound to inhibit domestic economic development. With social and economic development, increment of population, improvement of urban and rural infrastructure, and upgrade of resident consumption structure, energy demand quickly goes up. The state's energy consumption increased from the amount equivalent to 1,386-million-ton coal in 2000 to 2,656-million-ton in 2007, with an annual growth rate of 9.7%. In the context of global financial crisis, trade protectionism returned. Carbon emission amount has become a new green barrier of developed nations and a new excuse of China Threat.

- Lock-in effect

The lock-in effect means present decisions will have continuous impacts on economic development in the next decades. The lock-in effect of low-carbon economy is remarkable. Once facilities and equipment of an organization become sunk cost, it will not upgrade these fixed assets within 15-20 years. For

example, coal-fired power plants built up recently will be locked by the huge investment and keep using the old technology in the coming years, emitting a great deal of carbon dioxide. Therefore, China needs to avert lock-in effect and path dependency.

- Lower position in the international division of labor among industries

Developing countries are walking on the way of heavy industrialization that advanced nations have gone through, so carbon dioxide emission is inevitably high in developing nations. Chinese industrialization has less technical content, added values and competitiveness compared with advanced nations. In the new turn of international industrial restructuring, China carries heavy chemical industry and manufacturing characterized by high energy consumption and carbon emission and low efficiency. Owing to low technical level and lack of capital, developing countries are under heavy pressure of energy conservation and emission reduction. The carbon tariff that advanced nations impose on developing ones will negatively affect exportation from developing nations, lessen traditional cost advantage in international trade, and weaken competitiveness of their products.

4. Strategies for developing low-carbon economy in China

4.1 Government guidance to impulse low-carbon economy from top to bottom

Low-carbon trade needs to be driven from top to bottom and requires tremendous investment. At the beginning, the cost of energy conservation is zero or low, but saved energy is limited. Under constant energy saving and emission reduction, the marginal cost must go up, where the marginal cost refers to the total cost increment caused by one-unit extra output. With regard to carbon dioxide emission, the marginal cost will increase while carbon emission reduction climbs up. As a result, in turn, the cost of profit-oriented organizations and economical consumers will magnify. So, the government is supposed to function, developing low-carbon economy by means of subsidies or carbon tax. For instance, Japanese photovoltaic manufacturers hold 70% of global market share in the sector during the period while they received government subsidies. After the government subsidy was cancelled, German and Chinese manufacturers, based on technical and cost advantages, seized the global market. This case shows the government shall guide low-carbon economy development in the modern industrial system through implementing proper policies. Electric bicycles, which are made in China and accord with standards of energy conservation and environment protection, are sold well in European and American markets. However, the national standards of electric bicycles are too rigorous. In this case, the government needs to support the industry by coordinating departmental profits and smoothing inspection mechanisms.

4.2 Developing low-carbon industries to support low-carbon trade

A British energy white paper indicates that British economic scale doubles over the past three decades, but energy consumption increases by only 10%. This achievement is contributed by energy utilization promotion, industrial restructuring, and modern service industry. To develop low-carbon trade, China has to advance low-carbon industries in an all-round way. However, it'll take a long time to realize low-carbon industries because of weak industrial basis and low energy utilization rate. What the Chinese government can do at present is to formulate and implement trade policies that stimulate enterprises to operate in a low-carbon way, in which enterprises will play a major part. Manufacturers are supposed to conserve energy as much as possible so as to reduce carbon dioxide emission to the largest extent. Government policies need to encourage enterprises to take up low-carbon production and operation businesses. Low-carbon industries and technologies, which are motivated to deal with climate change at the very beginning, will prevail in world economic development. In the future, core competitiveness of enterprises is going to be low-carbon products and technologies. The government should lead manufacturing enterprises to develop low-carbon products through various channels of industrial planning,

financial support, and preferential taxation. At the same time, the government should embolden enterprises to participate in setting up the global technological innovation mechanism, make breakthroughs in the fields of clean and high-efficiency energies, and hold competitive ascendancy in the international carbon reduction market. In addition, enterprises should publish environment reports on a periodical basis to make public of greenhouse gases generation and reduction in order to supervise and restrict themselves.

4.3 Transforming foreign trade development model and take part in standard establishment

World trade will follow the general trend of low-carbon economy in the coming years. Chinese foreign trade has to turn to the trend and make changes to follow the world step. The government needs to expedite the development of new energy and materials, speed up economic structure adjustment, promote industrial upgrade and transfer, improve energy conservation and pollutant emission, and urge enterprises to form a sense of green production and heighten low-carbon technical level. Domestic enterprises need to invent technologies and products in line with international standards, actively take part in formulating international standards, carry out more international cooperation projects in particular in clean energy and energy conservation, fulfill international obligations of emission reduction, and achieve emission reduction objectives. In the fields of energy conservation and new energy development, China needs to grasp technical and industrial ascendancy and safeguard national economic interest. China shall insist on the principle of "common but differentiated responsibilities" stimulated in the Kyoto Protocol, strive for more favourable development opportunities, formulate low-carbon economy development plans, and establish a low-carbon industrial system and consumption model. Effective and fruitful international cooperation will help actualize low-carbon trade. China needs to seek each and every opportunity to take part in international standard establishment through communications and negotiations. Besides, low-carbon trade requires a scientific and precise assessment system.

5. Conclusion

Low-carbon trade is a new economic pattern that China has to take to realize sustainable development. In the post financial crisis era, the trade protectionism is on the rise. Chinese expansion strength in the world market will be frustrated, but foreign trade will remain as the most powerful engine to drive china's economic boom. Chinese trade growth must be subject to low-carbon economy, because it's going to rule the world. Consequently, China needs to make a quick response and take resolute actions.

References

[1] You Li, C·N·Hewitt. The effect of trade between China and the UK on national and global carbon diox-ide emissions. Energy Policy, 2008, (36): 1907-1914

[2].Antweiler, W·, Copeland, B·R·, Taylor, M·S·Is Free Trade Good for the Environment? [J]· Ameri-can Economic Review, 2001,(91): 877-908

[3] Bin Shui, Robert C·Harriss· The role of CO2 embodiment in US-China trade[J]·Energy Policy, 2006,(34):4063-4069·